

THE SAFETY WALL - LIGHT 160 a HEAVY 200

TECHNICAL PRODUCT SPECIFICATIONS

The safety protection wall made of panels made of patented UHPFRC is characterized by high resistance to the effects of blast pressure waves and to penetration by conventional projectiles, shrapnel and secondary shrapnel.

The wall is primarily designed to protect high priority detached buildings, complexes, or construction parts of the critical infrastructure. The protective function depends on the method of foundation of the structure of the supporting columns and the internal arrangement of the UHPFRC panels.

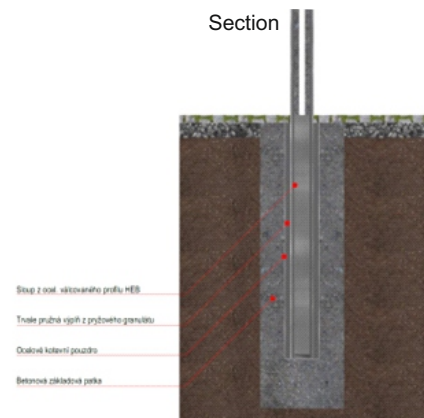
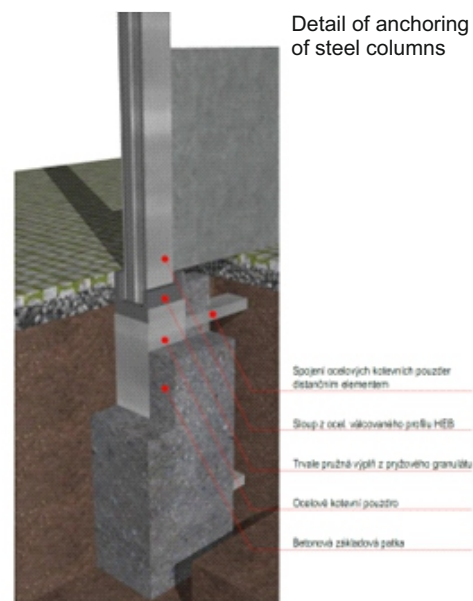
The installation is conditional to a thorough safety analysis and becomes an integral part of the overall security strategy of the building.

The safety protection wall consists of HEB profiles and (sandwich) panels certified Military Research Institute s.p. It is designed to protect objects important for national defence and defence industry. The product has been tested according to NATO STANAG 2280:2016 standard for ballistic, shrapnel and blast resistance, where it achieved one of the highest protection levels:

- o MODEL LIGHT A3, C4, D5.
- o MODEL HEAVY A4, C4, D5.

Protective elements Safety Walls are cast from HI TECH composite, patented ultra-high-strength concrete with dispersed microfiber reinforcement of high-strength ULTRA HIGH-PERFORMANCE FIBER REINFORCED CONCRETE - UHPFRC, with unique physical and mechanical properties verified by a certificate in the state testing laboratory of the Czech Technical University in Prague.

The technical solution is aimed at protecting objects from the effects of a pressure wave from the explosion of a nearby charge, from the effects of shrapnel and secondary projectiles after the explosion, and from the effects of direct shooting from light and heavy small arms. It can withstand the effects of a 120 mm mine, deflect a pressure wave equivalent to 20 kg of TNT from five metres released by the blast, while preventing penetration of a 7.62 x 54R/B32 API and 7.62 x 51/AP8 WC in the LIGHT version, or 12.7 x 99/API M8 and 14.5 x 114/API/ B32 in the HEAVY version.

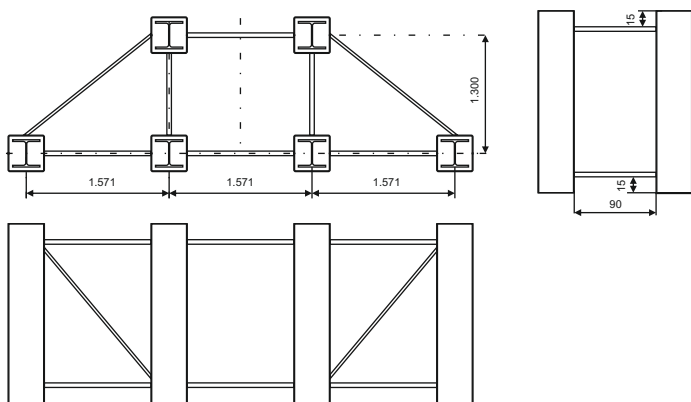


component dimensions of the element (mm)

	width	height	length	wall thickness	Hmotnost (kg)
the safety wall LIGHT 50	800	900	2.500	2x 80	2.034
the safety wall HEAVY 100	800	900	2.500	2x 100	2.710

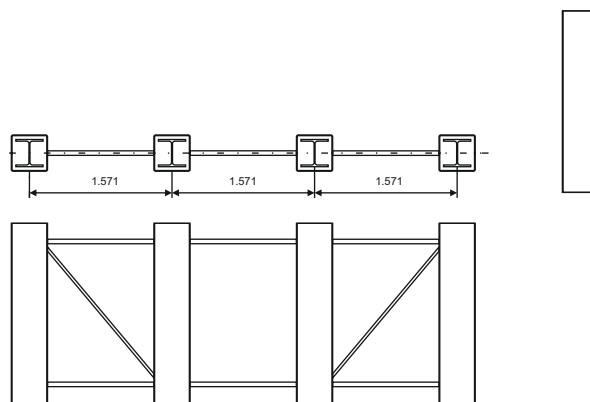
the safety wall LIGHT 160

in the version of the panels leads itself



the safety wall HEAVY 200

in the version of the panels in a row





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The safety wall is the product of IBIPC and its strategic partners, CS Beton and WITKOWITZ Group.

The panels are manufactured by CS BETON using vibrolite technology, which gives the element a very smooth surface, superior strength and extreme resistance to water and chemical influences. The HEB steel profiles and steel anchoring sleeves are manufactured by WITKOWITZ GEARWORKS, assembly HUTNÍ MONTÁŽE performs the installation of the safety element at the designated location.

All suppliers hold the CE mark, which allows the free movement of goods within European Economic Area countries, and ISO 9000:2015 quality management. Technology processing of steel structures complies with TÜV standards.

Solution variants

- o MODEL LIGHT 160 - SIDE BY SIDE, NATO STANAG 2280 class - A3, C4, D5.
- o MODEL HEAVY 200 - SIDE BY SIDE, NATO STANAG 2280 class - A4, C4, D5.
- o MODEL LIGHT 160 - FULL LINE, NATO STANAG 2280 class - A3, C4, D5.
- o MODEL HEAVY 200 - FULL LINE, NATO STANAG 2280 class - A4, C4, D5.



CONSTRUCTION AND SAFETY DESIGN OF THE WALL

Construction

The protective function of the safety element consists of specially developed panels made of durable UHPFRC, which are uniquely embedded in steel profiles specifically anchored in the substrate. The effects of the pressure wave energy are absorbed in the elastic response of the entire protective element, the effects of shrapnel and projectiles are eliminated by the resistance of the individual panels. The design of the structure takes into account the relatively long wind action on the entire surface, the stacks with peak at the top of the structure, and a very short duration blast, with a peak at the ground and with a very different pattern of pressures. The design philosophy of the protective safety feature is the motto of **Inconspicuousness and Invulnerability**. It stands in a conventional development and is no different from similar intravilane elements where it evokes a conventional cavity wall.

Safety solutions and installation

The design of the safety element Wall allows the element to be installed without compromising structural integrity of the protected object. Three fields are always installed at the same time, the total protected area of one installation in three fields is 18m² with a construction height of four metres. Two variants of anchoring in steel sleeves in the ground allow the element to be placed either in line or offset in front of the objects of interest, defending them from different types of attack. In the event of an explosion, they effectively absorb the pressure wave, stopping ground secondary shrapnel from mines or grenades, protect against light or heavy machine gun fire, and generally reduce the effectiveness of the attack.

Single row construction is recommended where visually concealing the protected object is appropriate. A design with staggered panels, where even and odd panels form a gap for the pressure wave to break, is recommended for locations with high gusts or prolonged wind action. A design with offset panels stacked panels can withstand wind speeds of 120 m/s.

Long-term placement, maintenance, repairs

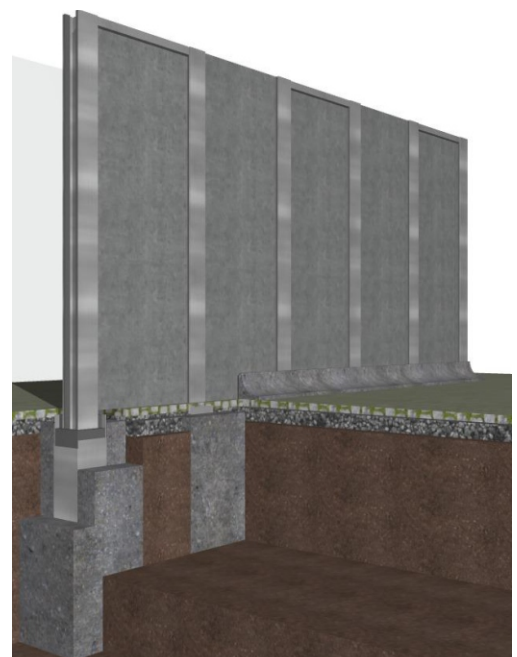
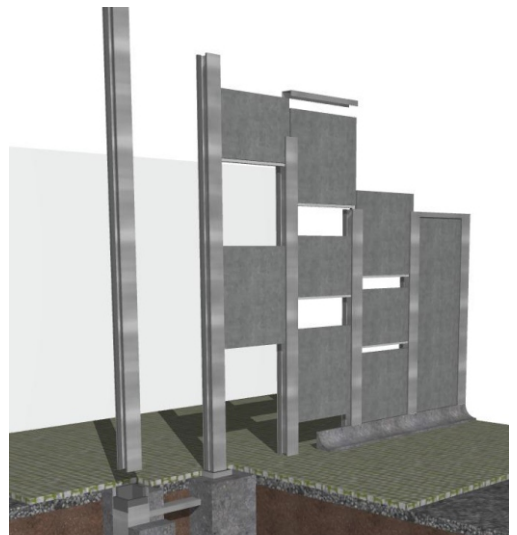
The steel casings of the support structure are concreted into the ground. The safety element Wall is developed without the need for further maintenance, only the protective coating of the steel part of the structure needs to be renewed over time. In the event of damage after an attack, the protective element is quickly and easily repaired by standardised and interchangeable elements.

Option

Design of the safety element the Wall is designed for the installation and management of technology IoT with prescribed IP protection values; these elements also integrate into Smart Cities projects. By power supply, the possibility of installing motion sensors, sensors or cameras.

We recommend the installation of these technologies in the range of instantaneous transmission of information on the change of limit critical conditions, and together with the visual content, linking them to the central protection console.

To increase the effectiveness of the protection, the panels can be supplied sandwiched with a special element.





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PROPERTIES AND CHARACTERISTICS

The safety wall panel consists of a cast-in-place of patent protected ultra-high strength concrete with dispersed microfiber reinforcement of ULTRA HIGH PERFORMANCE FIBER REINFORCED CONCRETE - UHPFRC.

This mix is characterised by the following parameters:

- o Bulk density from 2,400 kg/m³ to 2,600 kg/m³
- o Compressive strength from 100 MPa to 200 MPa
- o Flexural tensile strength from 3 MPa to 15 MPa
- o Dynamic modulus of elasticity from 38 GPa to 52 GPa
- o Young's modulus from 34 GPa to 46 GPa

Handling and storage

The safety wall panels are stored and fixed on pallets. HEB profiles loose.

Storage facilities and support structures shall be designed to allow storage, removal or replenishment of parts and elements in accordance with the technological procedures without risk of damage.

Storage areas shall be level, drained, paved and marked with safety signs prohibiting access by unauthorised persons.

The layout of the stored materials, the width and bearing capacity of the roads must be appropriate to the machinery used.

The stored material must be stored in such a way as to ensure its stability throughout the storage period and to prevent its deterioration.

Stockpiles, warehouses and individual material storage areas shall not be located in areas permanently threatened by the transport of loads, work at height, on roads where they would impede the operation of motor vehicles and other vehicles or the use of roads by pedestrians.

Sites intended for the removal of safety features from means of transport must have a level and sufficiently load-bearing surface and their connection to access roads shall provide safe access and egress.

The elements shall be stored and transported as they will be placed on site. Vertical rotation of 90° or 180° of the safety element is not permitted.

After the imperfections have been corrected, the safety element shall be handled by cranes or other equipment with sufficient handling capacity.

Damaged or defective elements and material must be clearly marked and stored separately.

Transportation

The safety Wall panels are stacked and fixed on pallets using stabilising straps and placed on the transport vehicles in the assembly position with secured for horizontal movement. HEB profiles loose and fixed with stabilising straps.

When transporting several pieces of safety wall panels, the gap/space between the pieces must be ensured so that they are not damaged by contact with each other. The securing of the element during transport must be carried out by means of retractable straps so that the position is not altered during the entire transport period and no damage by impact with each other or with the structure of the means of transport.

The driver is responsible for securing the load.

The consignee shall check the quantity with the order, quality and transport damage before depositing each delivery. The proper condition shall be confirmed by the authorised representative of the purchaser on the delivery note by stating his surname in block letters and signing his name.

Installation

The installation procedure of the outdoor safety Wall element is carried out according to the approved project documentation and the statement of the structural engineer. Taking into account the total weight of the product, it is necessary to check the load-bearing capacity of the substrate for the final positioning of the product in advance. The truss construction of the steel housings is cast in concrete into the subgrade, the housings are fitted with HEB profiles by using of a crane with a capacity of 3 tonnes and an arm length of at least eight metres.

- o LIGHT 160 panel size is 1.500 x 1.000 x 160 mm, weight 628 kg, securely fixed by crane during installation.
- o HEAVY 200 panel size is 1.500 x 1.000 x 160 mm, weight 785 kg, securely fixed by crane during installation.
- o HEB profile format is 300 x 300 x 6.000 mm, weight 540 kg.

Positioning of the element in the exterior

- o A space is created in the ground by ground mechanization for the placement of the truss structure with a volume of approx. 20 - 30 m³, depending on the type of structure.
- o The steel truss structure is placed in the prepared hole in the ground and covered with concrete.
- o After the concrete has cured, the steel sleeve structure is fitted with HEB profiles and then with UHPFRC safety panels.
- o At the end, the steel members of the structure are painted with the prescribed paint on the previous primer.

Workplace safety

During transport, handling and installation of the safety wall, all safety precautions arising from the laws, relevant regulations and current technical standards.

Responsibility for damages

All required tests to prove the quality of the product must be carried out before the components are incorporated into the building. Neither our contractors nor IBIPC, the manufacturers safety Wall, are not liable for defects in the goods caused by the carrier, improper handling and storage, improper assembly and unprofessional handling of the goods after they have been taken over by the purchaser, which are in violation of the technological procedure and legal regulations.

